

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraph beginning at page 1, line 25, as follows:

-- Fig. 1 shows a relationship between the classification of electromagnetic waves and wavelengths thereof. First, extreme ultraviolet rays and X-rays will be described with reference to Fig. 1. Extreme ultraviolet rays (EUV) and vacuum ultraviolet rays (VUV) are electromagnetic waves having a wavelength shorter than that of ultraviolet rays in the classification of the electromagnetic waves shown in Fig. 1(a). As can be seen from the comparison of the classification of the electromagnetic waves of Fig. 1(a) with the wavelengths of electromagnetic waves of Fig. 1(b), X-rays indicate electromagnetic waves having a wavelength of 0.001 to 50 nm, wherein soft X-rays indicate X-rays having a wavelength of 0.5 to 50 nm. While a boundary between extreme ultraviolet rays and vacuum ultraviolet rays and soft X-rays is not clearly determined and they are partly overlapped in the classification, extreme ultraviolet rays, vacuum ultraviolet rays, and soft X-rays are electromagnetic waves having an intermediate wavelength of the wavelengths of ultraviolet rays and hard X-rays. Extreme ultraviolet rays, vacuum ultraviolet rays, and soft X-rays have such a property that they have a small amount of transmittancy and absorbed by an air layer. However, since they have a particularly high photon energy, they exhibit a transmittance force which permits them to penetrate the interior of a material such as metal, semiconductor, insulator, and the like from the surface thereof by several hundreds of nanometers. Further, since soft X-rays have such a degree of a photon energy as to be absorbed in inner shell electrons of atoms constituting a material, they exhibit an apparent difference of absorption depending upon elements constituting various materials. This property of soft X-rays is most suitable to the study of various types of materials

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together with the high resolution thereof. Thus, soft X-rays contributes to the study and development of an X-ray microscope capable of observing living specimens as they are without drying and dyeing them.--

Please amend the paragraph beginning at page 2, line 22, as follows:

--Extreme ultraviolet rays (vacuum ultraviolet rays) and X-rays have a high photon energy as compared with that of visible rays and have a high transmittance force to materials. Since extreme ultraviolet rays and X-rays are not refracted in almost all the materials because of the above reason, it is difficult to make a lens. Accordingly, while reflectors are used to converge extreme ultraviolet rays and X-rays and to form images using them, even a metal surface does not almost always reflect extreme ultraviolet rays and X-rays. However, since the metal surface can reflect extreme ultraviolet rays and X-rays when they are incident on it at an angle almost close to the metal surface, an optical system making use of the oblique incidence could not hold being cannot be employed.--

Please amend the paragraph beginning at page 3, line 9, as follows:

--Thereafter, a great deal of attention was paid to a "multilayer film mirror" capable of reflecting extreme ultraviolet rays (vacuum ultraviolet rays) or X-rays including soft X-rays, which opened a way for developing an optical system in which these rays were incident at near normal angle on an extreme ultraviolet ray and X-ray imaging optical system. An X-ray micrometer making use of X-rays employs the above-mentioned multilayer film mirror. The multilayer film mirror will be described with reference to Figs. 2(a) and (b).--

Please amend the paragraph beginning at page 3, line 18, as follows:

-- Fig. 2(a) shows construction of the multilayer film mirror, and Fig. 2(b) shows

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Amit X

construction of a reflective film. In Fig. 2(a), the multilayer film mirror is composed of a multilayer film 20 formed on a substrate 10, and Fig. 2(b) shows an example of construction of a multilayer film used ~~to~~ for soft X-rays having a wavelength of about 13 nm (photon energy: 97 eV). In Fig. 2(b), the multilayer film 20 is composed of several tens to several hundreds of layers, each including a pair of molybdenum (Mo) and silicon (Si). The multilayer film 20 is attached to the substrate 10 as shown in Fig. 2(a). A normal incidence reflectance of 60% can be obtained by the multilayer film mirror constructed as described above.--

R5

Please amend the paragraph beginning at page 4, line 5, as follows:

-- Figs. 3(a) and (b) shows an example of a schematic construction of an X-ray apparatus using the multilayer film reflector shown in Fig. 2(a). In Figs. 3(a) and (b), the X-ray apparatus is composed of two reflectors, that is, a reflector having the reflective multilayer film 20 attached to the substrate 10 having a concave surface and a hole defined at the center thereof and a reflector having a reflective multilayer film 22 attached to a substrate having a concave surface similarly. Reference symbol L denotes X-rays and the light path thereof.--

X 6

Please amend the paragraph beginning at page 6, line 13, as follows:

-- For example, there is a trial for adaptively correcting a shape of a reflector by an actuator. This trial will be explained by a wavefront aberration correcting apparatus shown in Fig. 4. As shown in Fig. 4, the wavefront aberration correcting apparatus corrects a wavefront by correcting a shape of the multilayer film mirror 20 by applying force to the substrate 10 by an actuator 60 attached to the substrate 10 of a reflector. In the correcting apparatus, soft X-rays L passing through a pinhole 110 is are introduced to the reflector by a beam splitter 120 and reflected by the multilayer film mirror 20. In the above construction, when a knife edge 130 is

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inserted into the light path of the soft X-rays L passing through the beam splitter 120, a shape of a mirror surface can be measured by analyzing an image projected onto a two-dimensional detector 150 with a computer 160. The shape of the reflector is corrected by operating the actuator 60 by a control circuit 170 based on a result of the measuerment measurement--

Please amend the paragraph beginning at page 8, line 11, as follows:

A 1

-- Fig. 1(a) is a view showing a classification of electromagnetic waves and wavelengths of electromagnetic waves, and Fig. 1(b) is a view showing wavelengths of electromagnetic waves;--

Please amend the paragraph beginning at page 8, line 16, as follows:

A 8

-- Fig. 3(a) is a view showing a schematic construction of an X-ray apparatus using a multilayer film reflector, and Fig. 3(b) is a table illustrating the corresponding functionality of the apparatus of Fig. 3(a); --

Please amend the paragraph beginning at page 9, line 4, as follows:

A X

-- Figs. 8(a) - (c) is a view showing procedures for correcting the multilayer film mirror of the another embodiment, wherein Fig. 8(a) shows the correction film formed on the multilayer film that is formed on the substrate, Fig. 8(b) shows the correction film cut away by milling, and Fig. 8(c) shows the multilayer film cut away by milling; --

Please amend the paragraph beginning at page 9, line 6, as follows:

-- Fig. 9(a) is a symbolic representation of the Mo correction film being cut away, and Fig. 9(b) is a graph showing a case in which an auxiliary film and the multilayer film which has the number of cycles larger than that necessary to saturate a reflectance are cut away;--

Please amend the paragraph beginning at page 17, line 19:

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X⁰
--Figs. 8(a) - (c) explains a method of correction using the correction film and the multilayer film shown in Fig. 7.

Please amend the paragraph beginning at page 18, line 2, as follows:

X¹¹
--While the uppermost surface of the correction film and the like having been milled by the method is roughened, a transmission wavefront is ~~not almost~~ hardly affected by the roughness because the difference of the refractive index thereof to vacuum is small.--

Please amend the paragraph beginning at page 18, line 6, as follows:

X¹²
-- Figs. 9(a) and (b) comprise is a graph showing an example that after a multilayer film was formed in the number of cycles which was larger than that necessary to substantial saturation and a correction film was formed thereon, the correction film and the multilayer film were cut away from the upper portions thereof as explained in Figs. 7 and 8(a) - (c), and a change of wavefront phase was measured. As shown in Fig. 9(a), after 121 cycles of a Mo/Si multilayer film was formed and a molybdenum (Mo) correction film of 300 Å was formed thereon, the Mo correction film was cut away from the upper portion thereof. A complex refractive index of silicon (Si) n_{Si} and a complex refractive index of molybdenum (Mo) n_{Mo} that formed the multilayer film to soft X-rays having a wavelength of 12.78 nm were as follows.

$$n_{Si} = 1.00276 - 0.0015i$$

$$n_{Mo} = 0.9324 - 0.00598i$$

Further, a reflectance of the 300 Å correction film and the 121-multilayer film was 56.2%.--

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